CLAIMS

1. A nozzle device, comprising:

a spray hole for spraying washing water;

a pipe forming a first flow path that introduces the washing water to the spray hole; and

a cover member having the spray hole, provided so as to surround said pipe, and integrally formed of a cylindrical metal whose front end is closed,

a space between the pipe and the cover member forming a second flow path that introduces the washing water to the spray hole.

2. The nozzle device according to claim 1, further comprising a spray member having an orifice and merging the washing water supplied from said first flow path and the washing water supplied from said second flow path to introduce the merged washing water into said orifice.

3. The nozzle device according to claim 2, wherein

said spray member forms a spray space having an opening at its one end and having the orifice at the other end,

said first flow path introduces the washing water to said spray space from said opening,

said second flow path introduces the washing water to

the spray space from its peripheral surface, and

said spray space has a cross-sectional area that gradually or continuously decreases from said opening to said orifice.

4. The nozzle device according to claim 3, wherein

said spray space includes a first space having a first inner diameter from said opening to said orifice, a second space having a second inner diameter smaller than said first inner diameter, and a third space having a third inner diameter smaller than said second inner diameter, and

the washing water introduced from said second flow path is supplied to the second space.

5. The nozzle device according to claim 4, wherein

said second space is a cylindrical space, and

the washing water introduced from said second flow path is supplied along an inner peripheral surface of said cylindrical space.

6. The nozzle device according to claim 5, wherein the axis of said second flow path is directed inward from a peripheral wall of said cylindrical space such that the washing water is discharged toward the outermost periphery of a swirl having no vorticity within said cylindrical space

from said second flow path.

7. The nozzle device according to claim 4, wherein said first space has an inner diameter that continuously decreases from said opening to said second space.

8. The nozzle device according to claim 4, wherein said third space has an inner diameter that continuously decreases from said second space to said orifice.

9. The nozzle device according to claim 4, wherein the inner diameter of said cylindrical space is two times to five times the inner diameter of said orifice.

10. The nozzle device according to claim 3, wherein the cross-sectional area of said first flow path is larger than the cross-sectional area of said opening of said spray space.

11. The nozzle device according to claim 2, wherein said spray hole is formed on a peripheral wall in the vicinity of a front end of said cover member, and

said spray member is inserted into the front end of said cover member.

12. The nozzle device according to claim 1, wherein the

front end of said cover member has a substantially hemispherical shape.

13. The nozzle device according to claim 1, wherein said metal is stainless.

14. The nozzle device according to claim 1, wherein said cover member is formed by drawing forming.

15. The nozzle device according to claim 1, wherein a part of the peripheral wall in the vicinity of the front end of said cover member is formed so as to have a flat surface, and said spray hole is formed on said flat surface.

16. The nozzle device according to claim 2, wherein said spray hole has a larger inner diameter than said orifice.

17. The nozzle device according to claim 2, wherein said spray member has a positioner abutting against an inner surface at the front end of said cover member such that said orifice is positioned relative to the spray hole.

18. The nozzle device according to claim 17, wherein said positioner comprises

a first flat portion formed in said cover member, and

a second flat portion formed in said spray member,

said pipe being inserted into said cover member such that said second flat portion in said spray member is opposite to said first flat portion in said cover member.

19. The nozzle device according to claim 18, further comprising an annular sealing member for watertightly sealing an area between said spray member around said orifice and said cover member around said spray hole.

20. The nozzle device according to claim 17, wherein said positioner comprises

a front end abutment portion provided at a front end of said spray member and abutting against the inner surface at the front end of said cover member.

21. The nozzle device according to claim 17, wherein the positioner comprises

a peripheral surface abutment portion provided in said spray member and abutting against an inner peripheral surface of said cover member.

22. The nozzle device according to claim 17, wherein the positioner comprises

an engagement portion provided at a rear end of said

cover member, and

a portion to be engaged, provided at a rear end of said pipe, with which the engagement portion is engaged.

23. A sanitary washing apparatus that sprays washing water supplied from a water supply source to the human body, comprising:

pressure means for pressurizing the washing water supplied from said water supply source;

a nozzle device; and

path selection means for selectively supplying the washing water pressurized by said pressure means to one or both of said first flow path and said second flow path in said nozzle device,

said nozzle device comprising

a spray hole for spraying washing water,

a pipe forming the first flow path that introduces the washing water to said spray hole, and

a cover member having a spray hole, provided so as to surround said pipe, and integrally formed of a cylindrical metal whose front end is closed,

a space between said pipe and said cover member forming said second flow path that introduces the washing water to said spray hole.

24. The sanitary washing apparatus according to claim 23, wherein

said e path selection means comprises

flow rate adjustment means for adjusting the ratio of the respective flow rates of the washing water supplied to the first flow path and the washing water supplied to the second flow path.

25. The sanitary washing apparatus according to claim 23, further comprising

heating means for heating the washing water supplied from said water supply source to supply the heated washing water to said pressure means,

said heating means being an instantaneous heating device that heats the washing water supplied from said water supply source while causing the washing water to flow.

26. A nozzle device, comprising:

a cylindrical human body washing nozzle having a spray hole for spraying washing water to the private parts of the human body; and

a nozzle cleaning member having an inner peripheral surface in a substantially cylindrical shape surrounding an outer peripheral surface of said human body washing nozzle,

said human body washing nozzle being provided so as to

be storable in said nozzle cleaning member and projectable from said nozzle cleaning member,

said nozzle cleaning member having a washing water introduction hole for introducing the washing water into an annular space between the outer peripheral surface of said human body washing nozzle and the inner peripheral surface of said nozzle cleaning member to spirally swirl the introduced washing water.

27. The nozzle device according to claim 26, wherein said human body washing nozzle comprises

a cylinder having a cylindrical inner peripheral surface, and

a cylindrical piston that can be accommodated within said cylinder and can project from said cylinder and has a spray hole at its front end,

said nozzle cleaning member being provided so as to surround the vicinity of the front end of said piston in a state where said piston is accommodated within said cylinder,

said piston being mounted on said cylinder so as to be swingable within said nozzle cleaning member.

28. The nozzle device according to claim 27, wherein said piston comprises

a pipe forming a first flow path that introduces the

washing water to said spray hole,

a cylindrical cover member having said spray hole, provided so as to surround said pipe, and closed at its front end, a second flow path that introduces the washing water to said spray hole being formed between said cover member and said pipe, and

a spray member, provided at a front end of said pipe and having an orifice, for merging the washing water supplied from said first flow path and the washing water supplied from said second flow path to introduce the merged washing water into said orifice.

29. The nozzle device according to claim 26, wherein said washing water introduction hole is provided such that the washing water introduced into said nozzle cleaning member can be sprayed in a direction substantially tangential to an outer peripheral surface of said human body washing nozzle.

30. The nozzle device according to claim 26, wherein a front end of said human body washing nozzle projects from said nozzle cleaning member when the human body washing nozzle is stored.

31. A sanitary washing apparatus that sprays washing water supplied from a water supply source to the human body,

comprising:

a nozzle device;

first washing water supply means for supplying washing water to said human body washing nozzle in said nozzle device,

second washing water supply means for supplying washing water to said washing water introduction hole of said nozzle device; and

a heating device that instantaneously heats the washing water supplied from said water supply source,

the washing water heated by said heating device being vapor,

said nozzle device comprising

a cylindrical human body washing nozzle having a spray hole for spraying washing water to the private parts of the human body, and

a nozzle cleaning member having an inner peripheral surface in a substantially cylindrical shape surrounding an outer peripheral surface of said human body washing nozzle,

said human body washing nozzle being provided so at to be storable in said nozzle cleaning member and projectable from said nozzle cleaning member,

said nozzle cleaning member having a washing water introduction hole for introducing washing water into an annular space between the outer peripheral surface of the human body washing nozzle and the inner peripheral surface

of said nozzle cleaning member to spirally swirl the introduced washing water.

32. The sanitary washing apparatus according to claim 31, further comprising

a toilet seat,

a human body detection sensor that detects the presence or absence of the human body on said toilet seat, and

a controller that controls the supply of the washing water to said washing water introduction hole by said second washing water supply means on the basis of an output of said human body detection sensor,

said controller not supplying the washing water heated by said heating device to said washing water introduction hole when said human body detection sensor detects the human body.

33. The sanitary washing apparatus according to claim 31, further comprising

a branched pipe that can discharge a part or all of the washing water supplied from said water supply source outward,

the second washing water supply means supplying at least a part of the washing water flowing in said branched pipe to said washing water introduction hole.

34. A sanitary washing apparatus comprising:

a nozzle device having a spray hole for spraying washing water supplied from a water supply source to the human body;

divergent angle adjustment means for changing the divergent angle of the washing water sprayed from said spray hole of the nozzle device;

advancing or retreating driving means for moving said nozzle device so as to advance or retreat between a forward position and a backward position; and

control means for controlling said advancing or retreating driving means and said divergent angle adjustment means such that the advancing or retreating movement of the nozzle device by said advancing or retreating driving means and the change in the divergent angle of the washing water from said spray hole of said nozzle device are combined with each other.

35. The sanitary washing apparatus according to claim 34, wherein

said control means controls the advancing or retreating driving means and said divergent angle adjustment means such that the divergent angle of the washing water from said spray hole of said nozzle device is changed while said nozzle device repeats the advancing or retreating movement between said forward position and said backward position.

36. The sanitary washing apparatus according to claim 34, wherein

said control means controls the advancing or retreating driving means and said divergent angle adjustment means such that the washing water from said spray hole of said nozzle device is alternately switched to dispersed flow and linear flow while said nozzle device repeats the advancing or retreating movement between said forward position and said backward position.

37. The sanitary washing apparatus according to claim 34, wherein

said control means controls said advancing or retreating driving means and said divergent angle adjustment means such that the divergent angle of the washing water from said spray hole of said nozzle device is changed while said nozzle device is moving from said forward position to said backward position or from said backward position to said forward position.

38. The sanitary washing apparatus according to claim 34, wherein

said control means controls said advancing or retreating driving means and said divergent angle adjustment means such that the washing water from said spray hole of said

nozzle device is switched to linear flow and dispersed flow while said nozzle device is moving from said forward position to said backward position or from said backward position to said forward position.

39. The sanitary washing apparatus according to claim 34, wherein

said control means controls said advancing or retreating driving means and said divergent angle adjustment means such that the divergent angle of the washing water from said spray hole of said nozzle device is changed in a state where said nozzle device is stopped for a predetermined time period at said forward position or said backward position.

40. The sanitary washing apparatus according to claim 34, wherein

said control means controls said advancing or retreating driving means and said divergent angle adjustment means such that the washing water from said spray hole of the nozzle device is alternately switched to dispersed flow and linear flow in a state where said nozzle device is stopped at said forward position or said backward position.

41. The sanitary washing apparatus according to claim 34, further comprising

setting means for setting a combination of the advancing or retreating movement of said nozzle device by said advancing or retreating driving means and the change in the divergent angle of the washing water from said spray hole of the nozzle device.

42. The sanitary washing apparatus according to claim 34, wherein

said nozzle device comprises

a first flow path that introduces the washing water from said water supply source to said spray hole,

a second flow path that introduces the washing water from said water supply source to said spray hole, and

rotating flow generation means for generating rotating flow in the washing water in said first flow path, and

said divergent angle adjustment means comprises flow rate adjustment means for adjusting the respective flow rates of the washing water supplied to said first flow path and the washing water supplied to said second flow path.

43. The sanitary washing apparatus according to claim 42, wherein

said rotating flow generation means has a cylindrical chamber, and

the washing water in said first flow path is supplied

along an inner peripheral surface of said cylindrical chamber.

44. The sanitary washing apparatus according to claim 34, further comprising

pressure means for pressurizing the washing water while subjecting the washing water supplied from said water supply source to periodical pressure fluctuations, to supply the pressurized washing water to said nozzle device.

45. The sanitary washing apparatus according to claim 34, further comprising

heating means for heating the washing water supplied from said water supply source to supply the heated washing water to said pressure means.

46. The sanitary washing apparatus according to claim 45, wherein

said heating means is an instantaneous heating device that heats the washing water supplied from said water supply source while causing the washing water to flow.